

UEB330

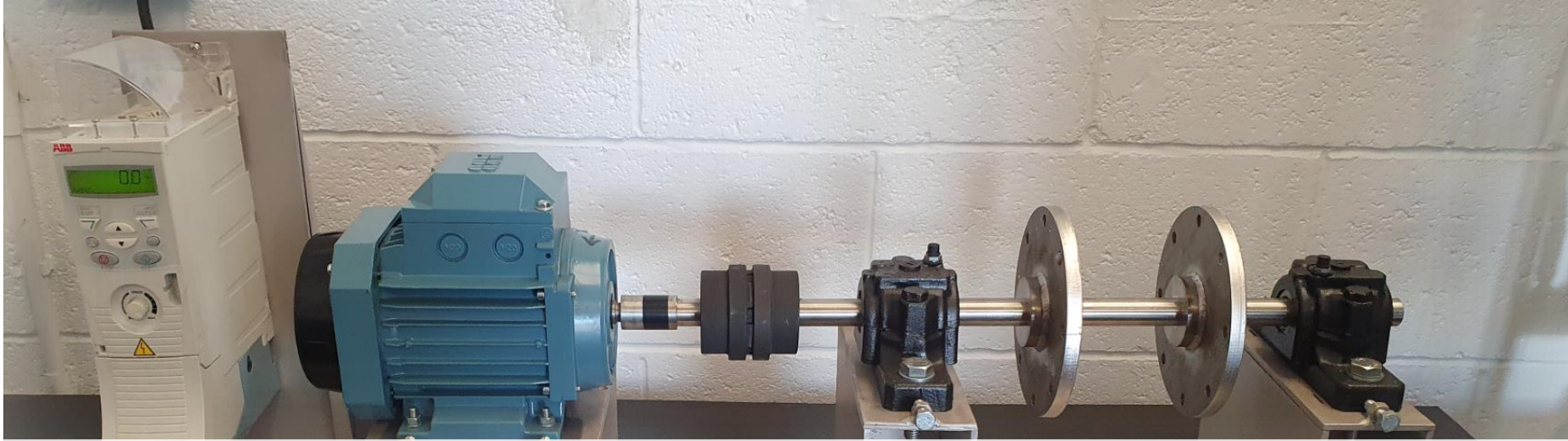
Functional
Trials



Introduction

The purpose of this trial was to assess the benefits, such as increased high frequency data between a standard accelerometer, and the CTC UEB330 100mV/g ultrasound sensor.

Setup



The PFE Limited Trials Rig was setup on a low-speed using the VFD, at a frequency of 1Hz, giving an approximate shaft speed of 59 rpm.

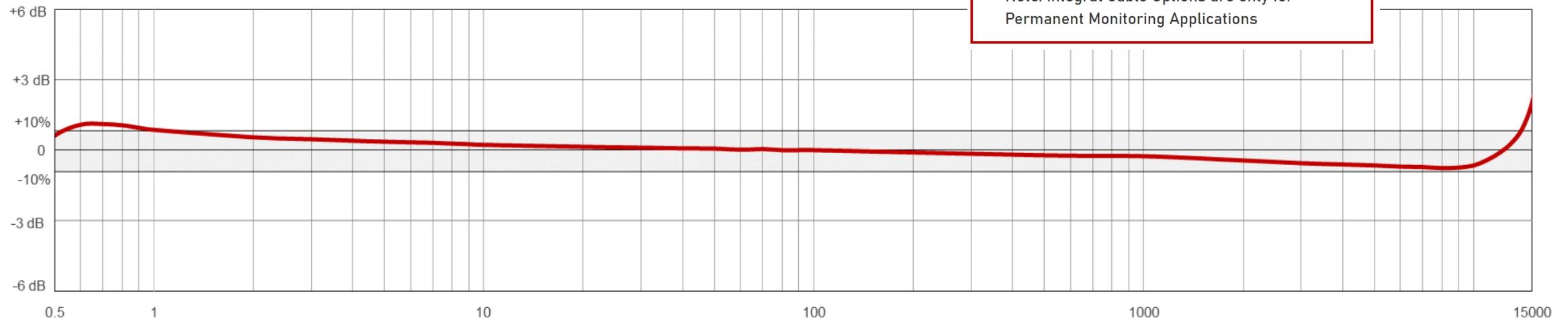
Trial Conditions

- Mounting location and type for both sensor types to be identical
- Programming is to be identical
- Collection device is to also be identical

"Standard" Sensor Properties

100 mV/g sensor:

AC102 TYPICAL FREQUENCY RESPONSE



Product Features

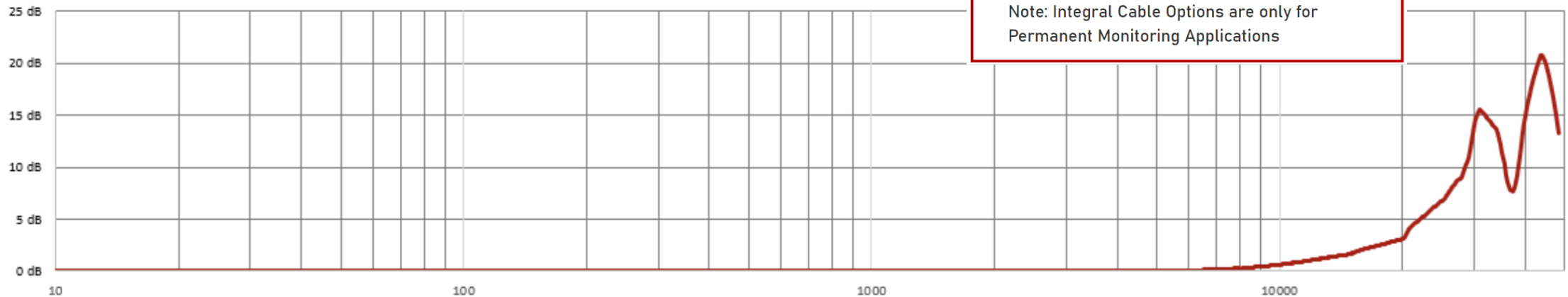
Affordably Priced, Hermetically Sealed Sensors
Perfect for Thousands of Applications

- ▶ 100 mV/g Sensitivity
 - ▶ Standard 2 Pin MIL Connection or Integral Cable
- Note: Integral Cable Options are only for Permanent Monitoring Applications

UEB330 Sensor Properties

100 mV/g small sized sensor:

UEB330 TYPICAL FREQUENCY RESPONSE



Product Features

High Frequency Ultrasound Accelerometer

- ▶ High Amplitude Resonance Peak for Stress Wave Measurement Techniques
- ▶ IEPE Amplifier Technology
- ▶ 2 Pin Mini-MIL Connection or Integral Cable
Note: Integral Cable Options are only for Permanent Monitoring Applications

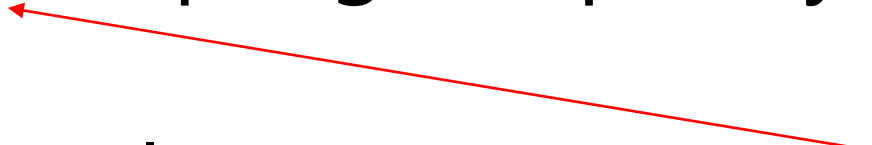
Trial Rig Modification

A defect was put into the non drive end bearing of the test rig rotor for the purposes of producing 'stress waves'.

Trial 1 – Waveform

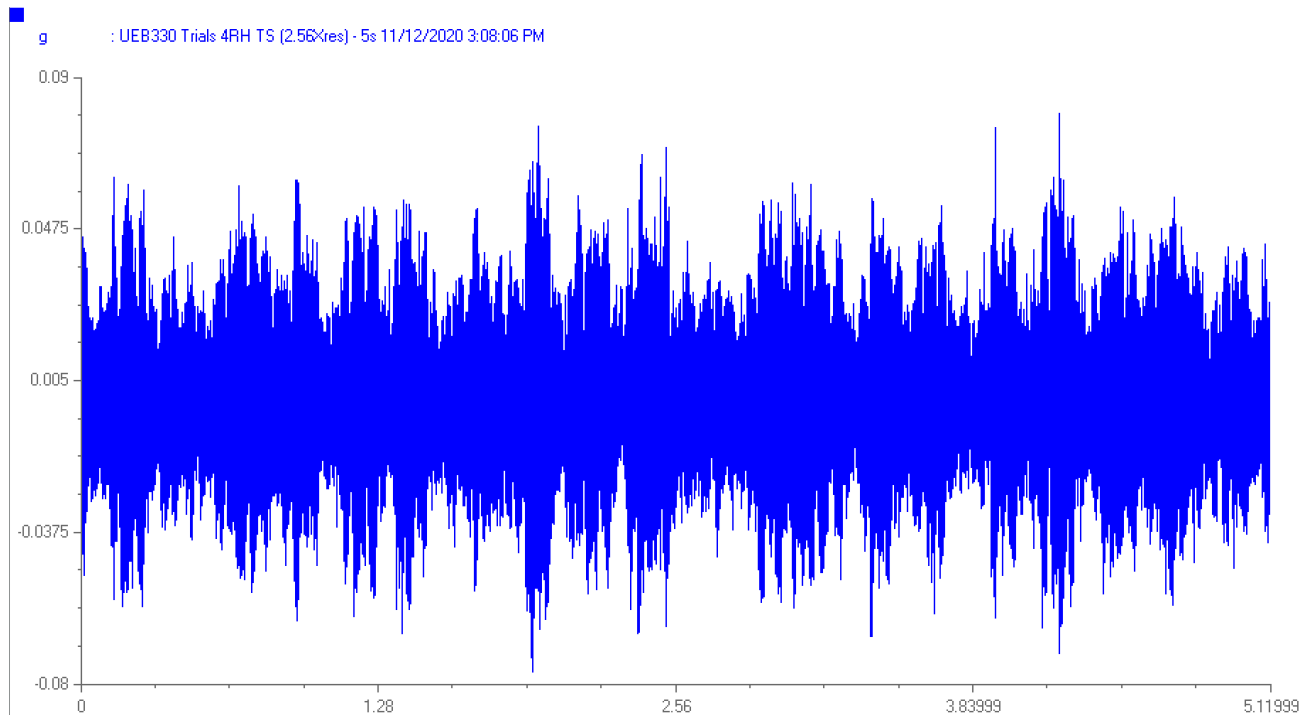
- 10Hz high pass filter
- 102.4 kHz Sampling Frequency
- 512,000 samples

Significance: 2.56 x 44 kHz
(UEB resonance freq)



Trial 1 – Waveform

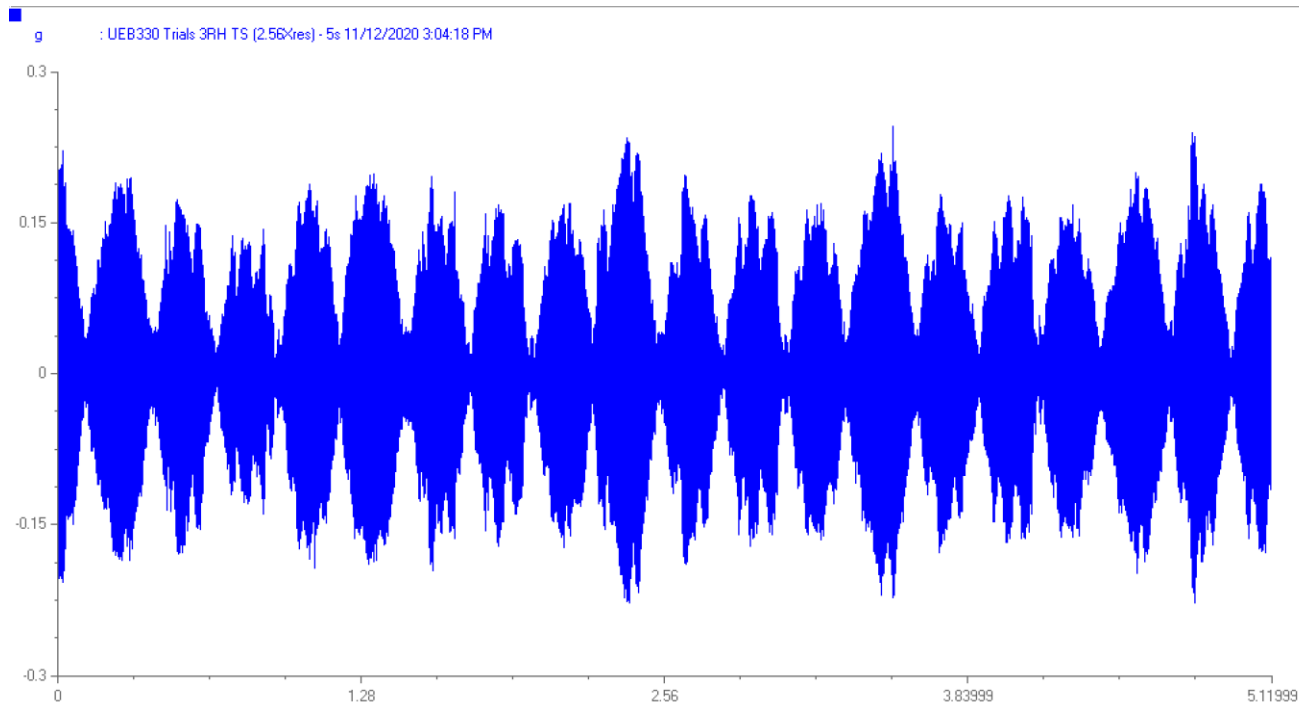
Standard Accelerometer



- Low Level modulation
- ~0.085 g's pk(+),
~0.078 g's pk (-)
- ~0.157g's pk-pk

Trial 1 – Waveform

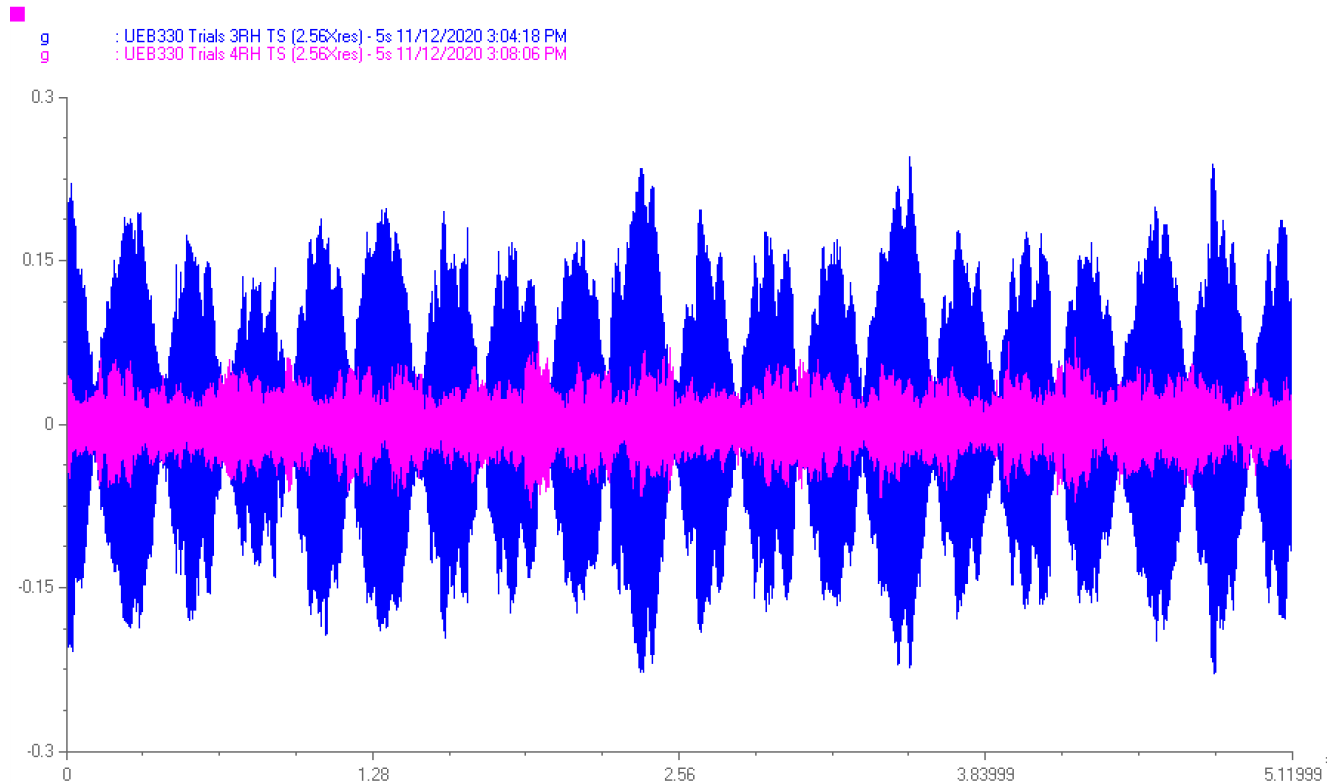
UEB330



- Much clearer modulation
- ~0.25 g's pk(+),
~0.23 g's pk (-)
- ~0.475g's pk-pk

Trial 1 – Waveform

Overlay



Blue: UEB330

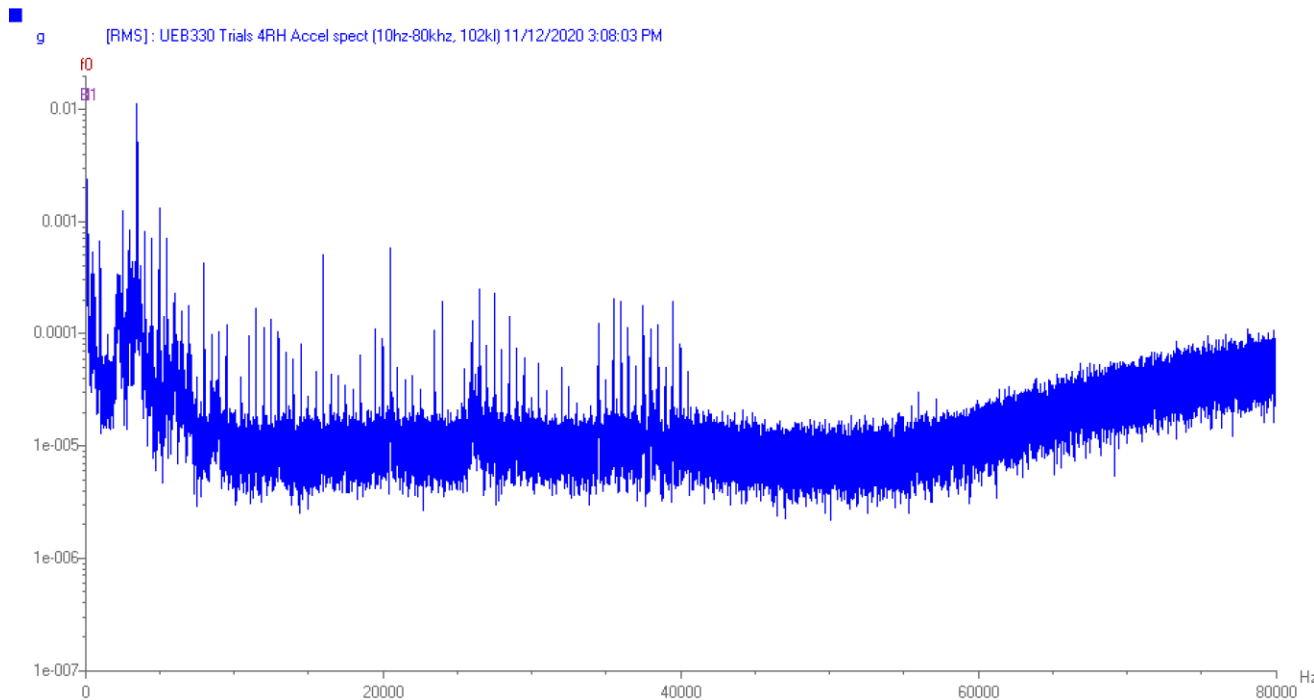
Magenta: Standard

Trial 2 – HF Spectrum

- 10Hz high pass filter
- 80kHz Fmax
- 102,400 lines (a little overkill)

Trial 2 – HF Spectrum

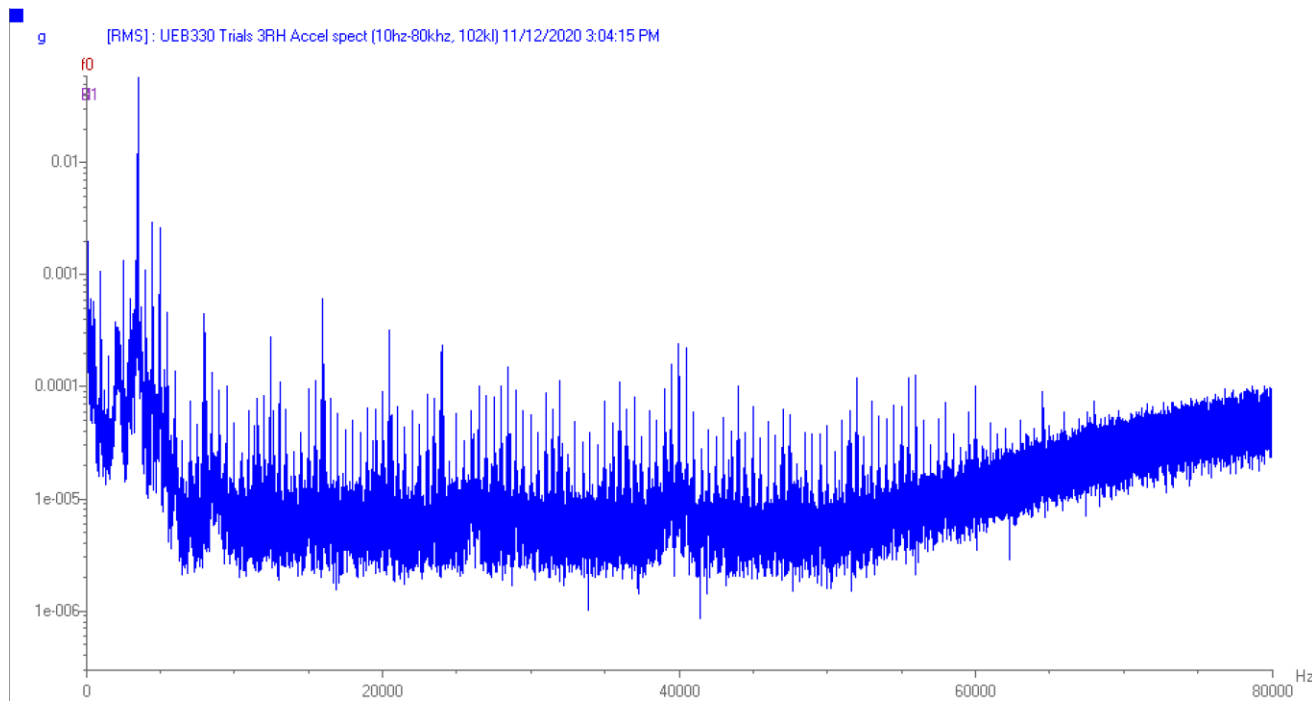
Standard Accelerometer (*logarithmic y axis*)



- Some harmonic content up to just under 40 kHz.
- Low amplitude (due to the speed)

Trial 2 – HF Spectrum

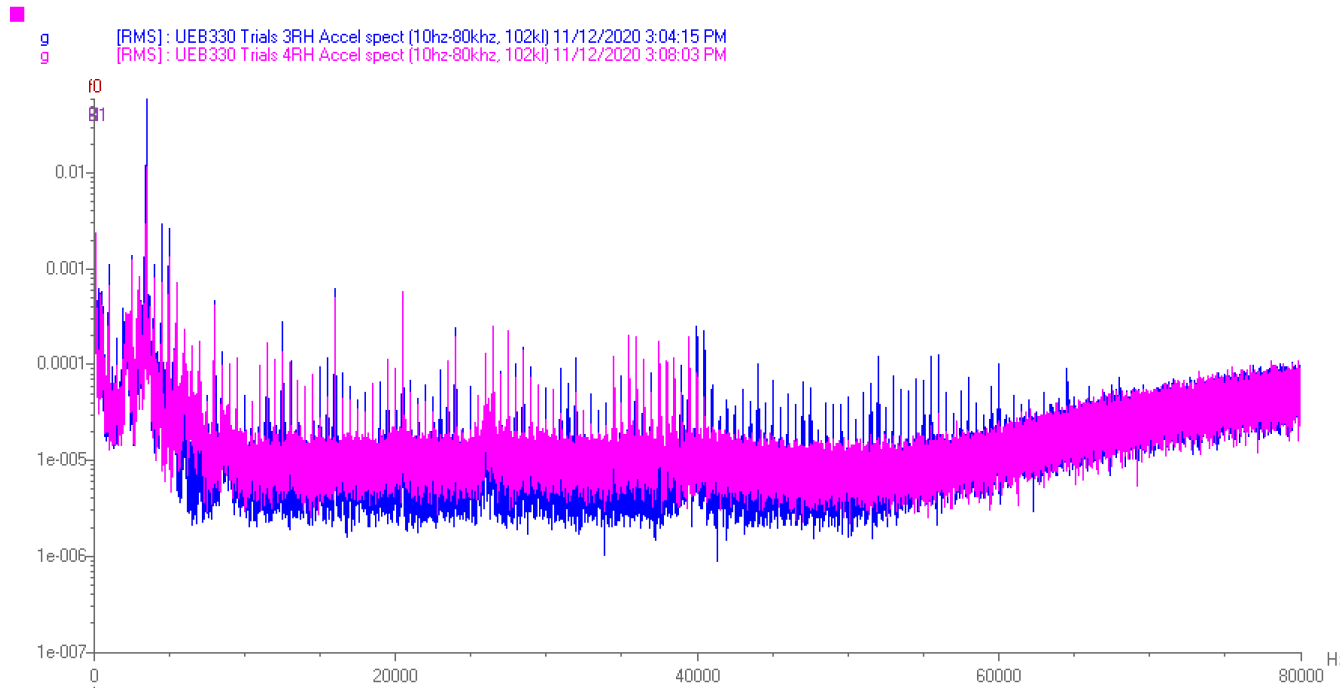
UEB330 (*logarithmic y axis*)



- Harmonic content exceeding 40kHz up to ~65 kHz
- Low amplitude (due to the speed)

Trial 2 – HF Spectrum

Overlay (*logarithmic y axis*)



Blue: UEB330

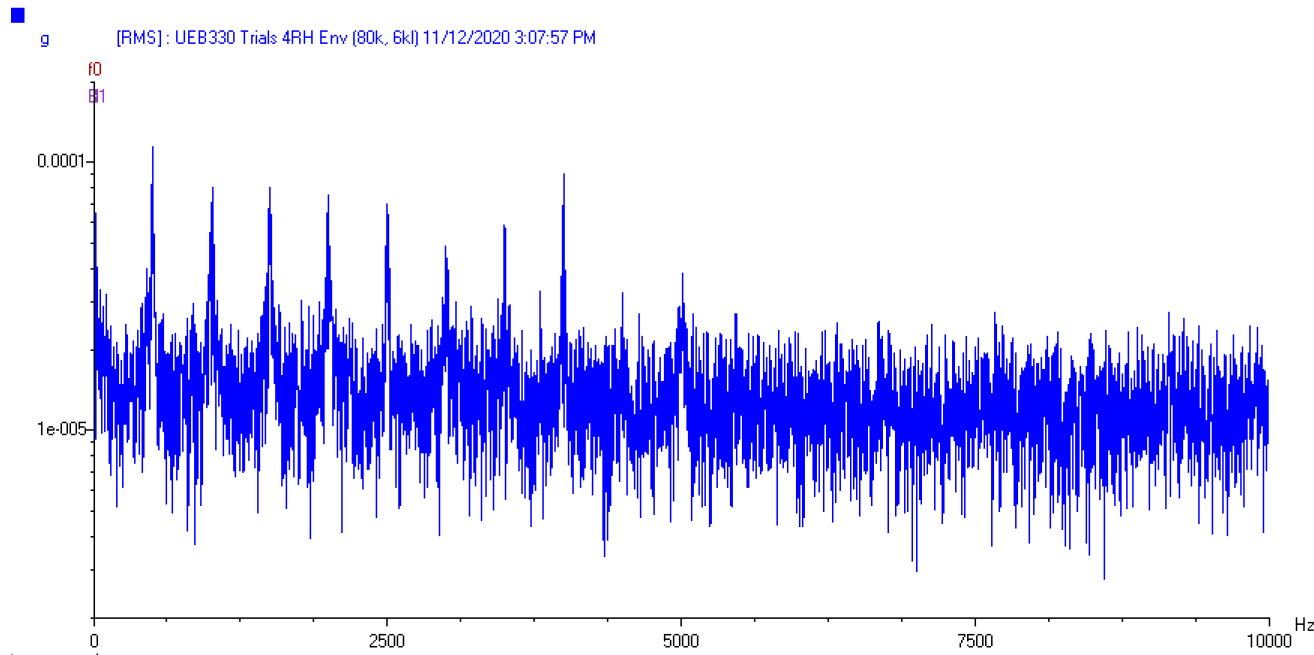
Magenta: Standard

Trial 3 – Enveloping

- 10Hz high pass filter
- 80kHz Fmax
- 6400 lines
- Band pass width 20kHz
- Centre frequency 44 kHz

Trial 3 – Enveloping

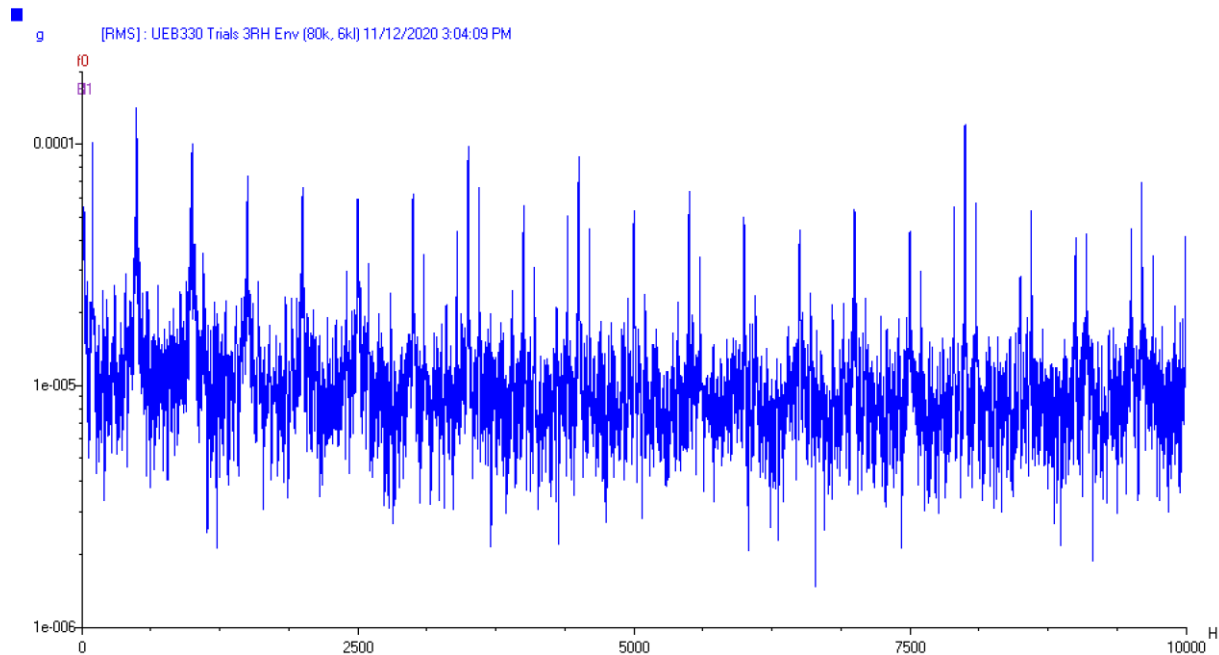
Standard Accelerometer (*logarithmic y axis*)



- Some harmonic content up to ~4kHz enveloped frequency.
- No clear sidebands

Trial 3 – Enveloping

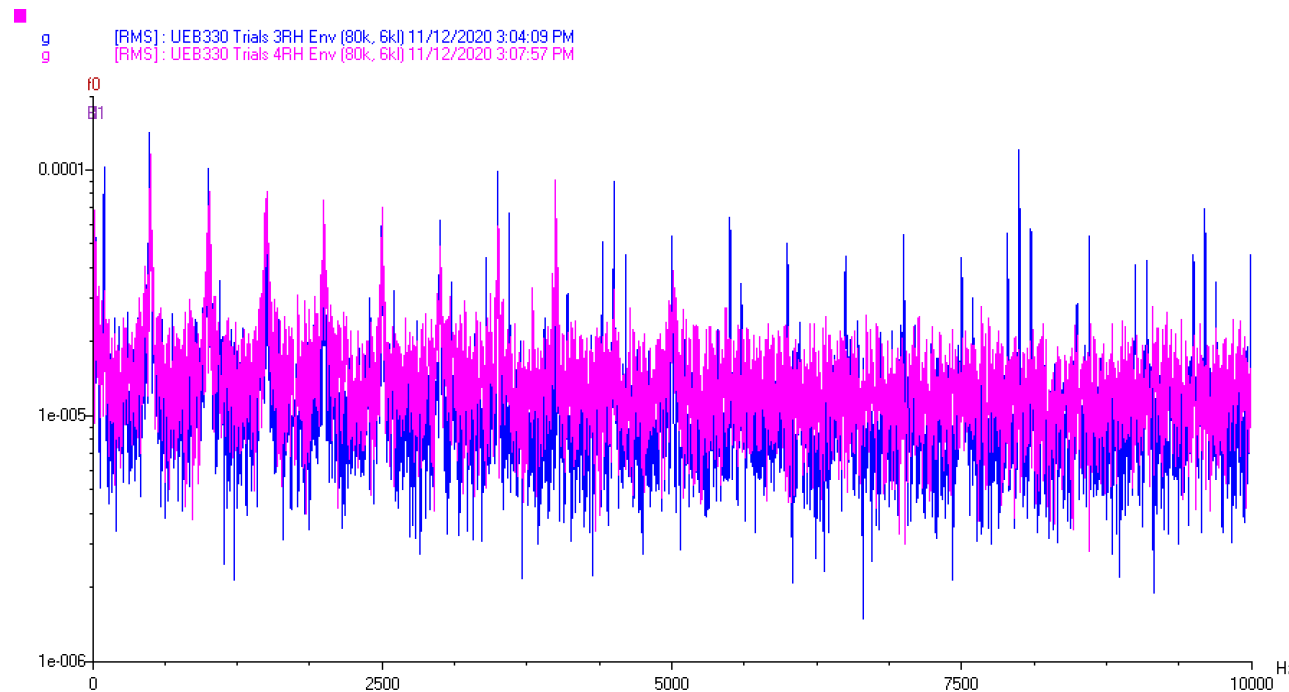
UEB330 (*logarithmic y axis*)



- Harmonic content throughout the enveloping range
- Clear sidebands in the mid-range

Trial 3 – Enveloping

Overlay (*logarithmic y axis*)



Blue: UEB330

Magenta: Standard

Conclusion

The UEB330 produced a more clear shape in the waveform, and more harmonic presence in the very high frequency range of the spectrum/enveloping.

A very high sample rate not available to all collectors was used, and this was a singular trial, some further trials required, but the results show well thus far.